



Your Guide to Cardiac Surgery

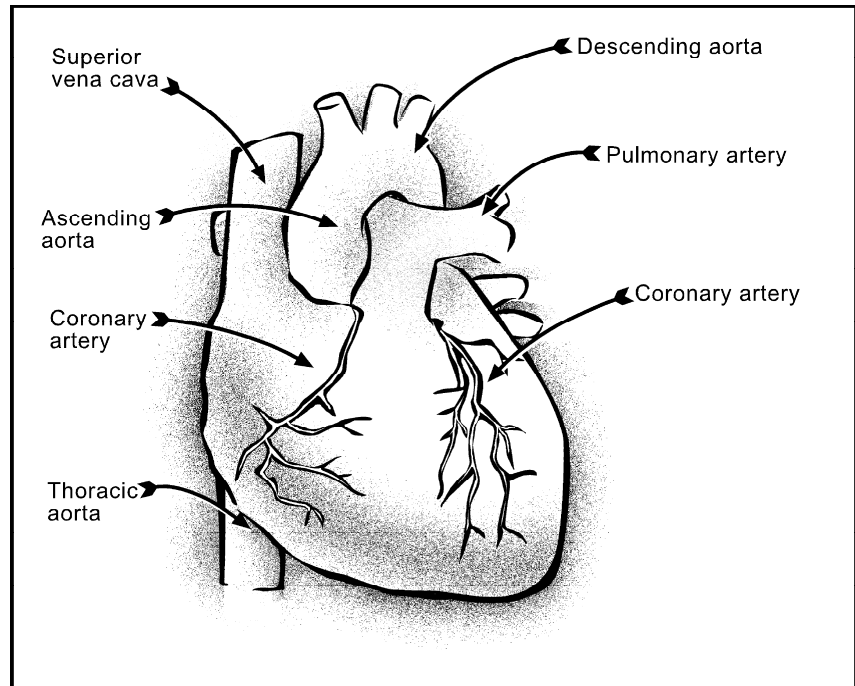


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Coronary artery bypass surgery and heart valve replacement

This manual describes coronary bypass surgery, heart valve replacement surgery, and your recovery from surgery. It also includes information about your hospital stay and your health care team, and a glossary of medical terms.

Coronary artery disease (also called *coronary atherosclerosis* or *ischemic heart disease*) refers to changes or processes that occur in the *coronary arteries*. These arteries supply oxygen to the heart muscle. This is a slowly evolving disease in which the inner layer of the artery becomes thickened and irregular and traps deposits of cholesterol and calcium.

Coronary Artery Bypass Surgery

Coronary artery disease may require *coronary artery bypass graft* (CABG) surgery. This is an operation that restores blood flow to the heart. The surgeon attaches a bypass graft to the aorta and to the coronary artery beyond the diseased section. This restores the blood flow in the area that was deprived due to blocks or narrowing inside the coronary arteries.

This improved blood flow to the heart muscle allows the heart to function more efficiently. It also prevents and eases *angina* (chest pain), prevents heart attacks, and may prolong life.

As many as 6 grafts are sometimes needed to bypass all the narrowed or blocked arteries. Bypass grafts are taken from the leg veins (*venectomy*), the *radial artery* in the arms, or the *internal mammary artery* (IMA). The blood vessel chosen for use in your case depends on your medical history.

The leg vein used is the *saphenous* vein. It lies close under the skin and goes from the inner ankle to the upper thigh. It can be removed without harming circulation in the leg.

The IMA, about the size of a coronary artery, lies under the chest wall. It can be detached and sewn into the coronary artery.

What are the risks?

Bypass surgery is complex, but it has a high success rate. Between 95% and 99% of people survive the surgery. Still, complications can occur. These include:

- Pneumonia
- Kidney damage
- Collapsed lung
- Angina
- Stroke
- Infection
- Excessive bleeding
- Heart attack
- Heart palpitations

Your surgery team will talk with you about your specific risks based on your heart condition, past surgeries, and other diseases you have. Other general concerns include the risks of anesthesia, pneumonia, arrhythmia, stroke, and wound infection. Also, because the valves are close to the areas that control heart function, there is a risk of a disruption in the heart rhythm. In this case, a pacemaker or treatment with medicine could be needed after the surgery.

Heart Valve Replacement Surgery

Valve replacement may be needed when one or more of the valves is diseased or no longer works.

Prosthetic Valves

There are 3 main types of prosthetic valves. These are *mechanical valves*, *bioprosthetic valves*, and *homografts*. There are long-term risks associated with all prosthetic valves.

There is also a risk of any prosthetic valve becoming infected. If you have valve replacement, you must take antibiotics before seeing the dentist and possibly before having other medical procedures. Talk with your cardiologist about care instructions related to your valve replacement before you see other health care providers for your other health care needs.

- **Mechanical valves** have proven to be very durable and they maintain a very normal blood flow. But the body sees mechanical valves as foreign objects and will try to coat them with *thrombin* (an element of the blood used in clotting) to make them less “foreign.” This is dangerous because pieces of the thrombin can break off, enter the bloodstream, and cause strokes.

Coumadin (warfarin) is a medicine that “thins” the blood and prevents the formation of thrombin on the valve. With a mechanical valve, a person must take Coumadin for life. People who take Coumadin do not clot normally and will bleed longer than a person not taking it.

There is also the risk of the mechanical valve clotting and causing death. Coumadin is used to minimize this risk. There is a risk of bleeding from Coumadin therapy, as well as a risk of clotting and having a stroke if you forget to take your Coumadin.

- **Bioprosthetic valves** are taken from the hearts of specially raised animals. They are chemically treated so that the body does not see them as foreign. Bioprosthetic valves maintain near-normal blood flows. They are not as durable as the mechanical valves. The “pig,” or porcine, valves are not suitable for children or patients with renal disease because they do not last as long as other kinds of bioprosthetic valves, since they are prone to calcium buildup.

The bioprosthetic valves can wear out, become *stenosed* (stiffened), and cause the same type of symptoms you may have had before surgery.

Most times, bioprosthetic valves last 10 to 15 years and then have to be replaced. Sometimes people with bioprosthetic valves do not require Coumadin or may require it for only 1 to 3 months after surgery. The position of the valve (*aortic* or *mitral*) and other factors in your medical history may affect the need for and length of Coumadin therapy. Your cardiologist and surgeon will decide if you need this medicine.

- A **homograft** is taken from a person after death. It is chemically treated so that the recipient’s body does not see it as foreign. Homografts are used for patients who are still growing. They are not often used for those who have a severe infection of their valves.

Like bioprosthetic valves, a homograft can wear out, become *stenosed* (stiffened), and cause the same type of symptoms you may have had before surgery.

Long-term Considerations

Risk of Infection

Artificial valves may be susceptible to infection. The American Heart Association recommends taking antibiotics before dental procedures and before any surgical procedure involving your lungs, bladder, or digestive system. **Tell your dentist, doctor, and other health care providers that you have an artificial heart valve.**

Signs of a valve infection should be reported to your health care provider **right away**. These signs include:

- Fever
- Abdominal tenderness
- Bloody urine
- New heart murmur
- New onset of shortness of breath
- New swelling around your legs or ankles
- Weight gain of 2 to 5 pounds over 3 days

Anticoagulation Therapy

You may need to take the anticoagulation medicine Coumadin to prevent clotting on the valve. If so, a pharmacist will talk with you about this medicine.

After discharge, your clotting time is checked every 3 to 5 days. Your dose will be adjusted as needed to maintain a therapeutic level. If you need long-term therapy, your clotting time will be checked every 4 to 6 weeks as long as you are taking Coumadin.

You may be asked to take low-dose aspirin in addition to your Coumadin therapy to provide more protection for your heart and chest area.

Preparing for Surgery

After you are admitted, many things will be done to prepare you for your surgery. A few things to keep in mind are:

- You will need X-rays, blood and urine tests, and an ECG.
- You will meet your cardiac surgeon and cardiac surgery team. They will talk with you about your operation and answer your questions.
- A member of the surgical team will ask you to sign a consent form to do your surgery.

- You will meet a member of the anesthesia care team. This person will ask you about your medical history.
- You will be asked if you have any “advance directives.” Two common advance directives are a *living will* or *power of attorney for health care*. It is not required that you have either directive, but bring a copy to the hospital if you do. Your directive will be made part of your permanent record, so that your health care wishes are known.
- A staff member will teach you how to do slow, deep breathing with an *incentive spirometer* (a plastic instrument that measures how deeply you are breathing). You will be asked to practice deep breathing before your surgery. You will also be taught how to cough using a pillow. This will help with your recovery after surgery.
- Practice getting out of bed without using your arms several times before your surgery. After surgery, you must not lift, push, or pull anything more than 10 pounds with your arms until your doctor tells you it is OK to increase your arm activity level. This is because your *sternum* (breast bone) needs time to heal. Permanent stainless steel wires or cables will keep this bone together. You will be on *sternal precautions* for 6 to 8 weeks after surgery. These are restrictions on actions that might hinder your healing.

Day Before Surgery

- You will need to shower and scrub your chest and legs with a special soap before surgery. This is done to make the skin as free from bacteria as possible. If your legs, chest, or abdomen need to be shaved, this will be done in the operating room.
- You are allowed to eat and drink as usual the night before the surgery. Do not eat or drink after midnight, other than small sips of water with medicines.
- Try to get a good night’s rest before surgery. Ask your nurse for a sleeping pill, if needed.

Day of Surgery

Jewelry and watches must be removed before surgery. It’s best to keep these and other valuables at home, with family members, or in our hospital safe.

About 1 to 2 hours before surgery, you will change into a hospital gown and will be given medicines to help you relax. Your family may visit you on the nursing unit before your surgery. There is a waiting room for family and friends on the 2nd floor of the Surgery Pavilion near the operating room.

Depending on your kind of surgery, you will be in the operating room about 4 to 6 hours. When the surgery is done, the surgeon will come to talk with your family or will call them, if preferred. You will be taken to the 5-Southeast Cardiovascular Intensive Care Unit (CICU) after your surgery. It takes the nurses and doctors about 1 hour after you arrive in the CICU to get you settled, and then your family may come in to see you.

Anesthesia

You will be given an anesthetic for your operation to make you unconscious and free of pain. When you arrive in the operating room, some preparation is needed before you are anesthetized. After the skin is numbed, plastic catheters will be inserted into 2 of your arm veins. Medicines, fluids, and blood transfusions may be given through these. You will then be given a medicine to put you to sleep. After you are asleep, a plastic breathing tube will be inserted through your mouth and into your windpipe. Oxygen and other gases will be given to you through this tube throughout the operation. One member of the anesthesia care team will stay with you throughout the surgery and will closely monitor all of your vital functions.

The Heart-Lung Machine

The heart-lung machine, controlled by a *cardiopulmonary perfusionist*, keeps oxygenated blood pumping through your body during surgery. Blood returning to the heart is removed from the body by a set of tubes inserted into the right side of the heart. The heart-lung machine removes the carbon dioxide from the blood and provides the red blood cells with fresh oxygen, just as your lungs would. Another set of tubes carries the blood back to your heart.

Any surgery that requires a heart-lung machine is referred to as “open heart surgery,” whether or not the surgeon opens the heart.

Blood Requirements and Puget Sound Blood Center

The cardiac surgery team will use extra blood only when it is required. Between 60% and 70% of open heart operations can be done without blood transfusions.

Some patients will need transfusions of blood products such as packed red blood cells, platelets, or fresh frozen plasma. These are obtained from Puget Sound Blood Center.

The blood center uses only screened, unpaid volunteer donors. This means we depend on people’s willingness to donate blood. It is not required that you replace the donated blood you use – but friends, clubs, service organizations, or faith-based groups are often eager to help. Their donated blood helps ensure that this valuable resource will be available when it is needed.

The use of an all-volunteer system reduces the risk of viral illnesses being spread through transfusions. The blood center also tests donated blood for hepatitis and HIV/AIDS. Still, there is a slight risk of these diseases being spread through blood transfusions. According to the Puget Sound Blood Center, the estimated risk per unit of blood of contracting hepatitis B or hepatitis C after blood transfusion is 1 in 1,000,000. The risk of exposure to HIV (the virus that causes AIDS) as the result of a transfusion of blood in the Pacific Northwest is estimated to be about 1 in 1,900,000. Since 1985, when testing for HIV began, no patient has been reported to have contracted the AIDS virus from a transfusion provided by the Puget Sound Blood Center.

To learn more about blood donations or blood transfusions, call Puget Sound Blood Center at 206-292-6500.

Cardiovascular Intensive Care Unit (CICU)

The first 24 hours after surgery are the most critical. This is when most changes in your condition occur. This is also when you have minimal control over your recovery.

Visiting

In the UWMC Cardiovascular Intensive Care Unit (CICU), you will be monitored and cared for by highly skilled cardiac nurses. Most patients stay in the CICU for 12 to 24 hours. Family and close friends can visit. They are asked to coordinate their visits with the CICU nurse. The direct telephone line from the waiting room to the CICU should be used to let the nurse know visitors are waiting. When your visitors call, they will need to tell the nurse the number of people in their group.

Although family may visit any time, we encourage them to leave the hospital at night to get some rest. Family members should leave a telephone number where they can be reached. They may call the CICU at 206-598-6500 at any time. Ask one family member to make phone inquiries to the CICU and then relay information to others.

Care and Monitoring

A nurse will care for you during the critical hours after surgery. There will also be a doctor from the cardiac surgery team available around the clock. During your stay in the CICU, your heart rate, rhythm, and blood pressure will be monitored constantly. This is done using patches on your chest and plastic catheters inserted into an artery or vein. Blood samples are also drawn through these catheters.

IV Catheters

Along with monitoring equipment, you will have several intravenous infusions (IVs). These IVs allow the nurse to give medicines, fluids, and blood transfusions as needed. All except one of these IVs are usually stopped after 12 hours.

Pacemaker Wires

During surgery, your doctor will place small, temporary pacemaker wires on the surface of your heart. The ends of these wires will be taped to your abdomen and may be used after surgery to manage abnormal heart rhythms. The wires are easily removed before your discharge from the hospital.

Chest Tubes

After surgery, fluid must be drained from the chest cavity. This is done through chest tubes inserted at the time of surgery. There are 1 to 3 tubes, which are usually removed within the first 24 hours. It is normal to bleed slightly for the first 24 hours after surgery.

Urinary Catheter

A small rubber catheter is inserted into the bladder to drain urine during surgery and the first part of the recovery phase. It is removed 24 to 48 hours after surgery.

Respiratory Therapy

When you are taken to the CICU after surgery, your breathing tube is left in place and connected to a breathing machine (*ventilator*). This is needed until the effects of anesthesia wear off and you are awake enough to breathe on your own. Because of the breathing tube, you will not be able to talk or drink anything when you wake up.

After the breathing tube is removed, oxygen will be delivered by a face mask or nasal prongs. Leave the mask in place, as it delivers the extra oxygen you need at this time.

Your throat may be sore and your voice may be hoarse from the breathing tube. The hoarseness is because the breathing tube passes between your vocal cords. The soreness and hoarseness should improve with time. Ice chips may help if you have mouth dryness.

After the breathing tube is removed, you must take deep breaths and cough up secretions. If the secretions remain in your lungs, bacteria may accumulate and cause pneumonia. Pain from your incision makes coughing uncomfortable. *Splinting* the incision (hugging a pillow to your chest) and taking your pain medicine regularly will reduce the soreness and let you cough more effectively.

Incision pain may restrict your breathing and cause you to take shallow breaths. When this happens, partial collapse of the lungs may occur and keep you from getting enough oxygen. The incentive spirometer will encourage you to breathe deeply by showing how big the breaths you are taking are.

As soon as you are able, the nurse will have you sit on the edge of the bed or in a chair. This also helps with deep breathing and coughing.

Cardiac Telemetry Floor: On the Road to Recovery

When you are stable (usually 12 to 36 hours after surgery), you will be transferred from the CICU to the cardiac telemetry floor. Specially trained nurses will continue to assist you in your recovery. **The remainder of your recovery becomes a shared responsibility between you and the staff caring for you.** You will be expected to actively participate in your own care – cough and deep breathe, get out of bed, and begin eating normally.

For a few days, your heart rate and rhythm will be monitored with a portable transmitter called a telemetry box. Your cardiac team will assess your progress and prepare you and your family for discharge.

To recover from your surgery, you need to:

- ☐ **Do deep breathing.** Taking slow, deep breaths (at least 10 times an hour with your incentive spirometer) helps you fully expand your lungs. This will help release trapped secretions so you can cough them up. Clearing your lungs this way helps prevent pneumonia, helps you feel better, and speeds recovery.
- ☐ **Walk and increase your activity.** Activity also helps you to breathe more effectively. It strengthens your muscles, and helps your body regain the function it had before surgery. Maintain **sternal precautions** and do not use your arms to push, pull, or lift yourself out of a chair or bed (see page 13). The handout, “Activities of Daily Living After Heart Surgery,” also has tips and guidelines. Ask your nurse for a copy if you do not already have one.
- ☐ **Eat healthy foods to nourish your body with proteins, vitamins, and minerals so you can heal faster.** You will receive a regular diet after surgery. Even if you are not hungry, we encourage you to eat. Walking and increasing activity will help you build an appetite. If you have high blood sugar, you will be kept on a diabetic diet until your blood sugar levels normalize. This diet will help decrease infection risk and improve healing.

Discharge Teaching

The average length of stay in the hospital after surgery is 4 to 6 days. During your stay, you or your family will receive instructions to help you prepare for discharge to home. You will likely meet with a nurse, dietitian, pharmacist, and physical therapist. Before discharge, be sure to ask these cardiac care team members any questions you may have.

Exercise

Daily exercise should be a part of your life. Exercise helps maintain flexibility and gradually improves strength and endurance. The physical therapist will review exercises with you.

You should slowly increase your activity as you prepare for discharge. Once you are home, keep doing the exercises you learned while in the hospital.

Medicine

The medicines you will take after surgery help you recover. These medicines are prescribed for you and must be taken as directed. A pharmacist or a nurse will teach you about your medicines and answer any questions you may have.

Nutrition

What you eat affects your body's health. A registered dietitian or diet technician can help you learn how to eat for a healthy heart. They can give tips on heart-healthy food choices, shopping, and cooking. Ask your nurse how to set up an appointment with a dietitian.

Eating wholesome foods will help you heal faster. Your body needs the proteins, vitamins, and minerals that healthy foods supply. Even if you are not hungry, we encourage you to eat regular meals. Walking and increasing activity will help you build an appetite.

Insulin Management

Many patients who have not been diagnosed with diabetes will need insulin after surgery. Sometimes this is due to a side effect from a medicine, such as prednisone. Other times, you may have had borderline insulin needs that were not apparent before surgery.

If you have high blood sugar, you will be kept on a carbohydrate-managed diet until your blood sugar levels normalize. This diet will help lower your risk of infection and help your body heal.

Medical Alert Jewelry

For patients who have had valve surgery or who are taking Coumadin, we recommend buying a medical alert bracelet or necklace. Or, some patients prefer to carry wallet cards.

Many companies and some jewelry stores carry this type of identification. Here is one source for medical alert jewelry:

Medic Alert Foundation International

2323 Colorado Ave., Turlock, CA 95382

www.medicalert.org

888-633-4298

Other Topics

Before you are discharged, a nurse will review pain management, activity guidelines, incision care, when to call the doctor, emotional reactions after surgery, and discharge planning with you.

If you have questions or concerns, please ask. We want to make sure you are fully prepared to go home. Some patients and family members learn well by watching educational videotapes. We have many videos that you and your family members may watch.

Follow-up Visit

You will have a follow-up visit with your cardiac surgeon in 1 to 2 weeks. You will also need to make an appointment with your cardiologist or referring doctor after this follow-up visit.

Home at Last

You may be anxious about going home. We expect you to slowly return to a normal lifestyle. This section lets you know what to expect and how to care for yourself at home.

Pain Management

You can expect to have aches and pains. These are part of the healing process and may last up to 2 or 3 months. They often occur in the back, shoulders, neck, and chest. If you have had bypass surgery in which a leg-vein graft was used, it is common to have incision pain in that leg as well.

You may be given a prescription for pain medicine. Take your medicine as directed. If you are sore or uncomfortable, do not hesitate to take the medicine. Otherwise, you may find yourself not doing the amount of activity that you should. If the pain medicine is not working well, call your doctor. Other measures that may help ease muscle soreness include using a heating pad, gently massaging the area, or taking a warm shower.

Morning stiffness may be eased by doing the warm-up exercises you learned in the hospital. Many women find that wearing a good support bra reduces pain by decreasing strain on the chest muscles.

Incision Care

You may shower when you return home unless your doctor tells you not to. Wash your incisions gently with mild, non-perfumed soap and water, and pat them dry.

After your incisions heal fully, about 6 weeks after your surgery, you may bathe in a tub. You should not soak your incisions for longer than 5 minutes until all the scabs have fallen off and the incisions are closed. This will help to prevent infection.

Avoid taking very hot showers or baths or soaking in hot tubs, since this may cause you to become weak, dizzy, and possibly faint. This may occur due to the medicines you are taking and your surgery.

Unless your incisions are draining, it is best to leave them open to the air. If your clothing rubs or irritates an incision, you may cover the area with dry gauze. This gauze should be removed at night.

If your incisions are still draining when you leave the hospital, your nurse will give you instructions and supplies to care for your wounds at home. If you notice any signs of infection, such as redness, new drainage, or warmth or heat at the incision site, or you develop a fever (101°F or 38.5°C), call the Cardiac Surgery nurse practitioner on call right away: 206-598-6190.

Do not apply any medicine or lotion to your incisions until they are completely healed and the scabs have fallen off, unless you have been told to do so by your health care team.

After a vein is taken from a leg, there tends to be swelling (*edema*) in that leg for a while. This puts pressure on and pulls at the incisions. When sitting, elevate your legs. A lounge chair at home may be helpful. If you are going for long rides in the car (more than 30 minutes), sit in the back seat with your legs across the seat. Do not cross your legs when sitting or lying down. This limits the circulation and may increase swelling.

For some people with excess swelling in their legs, we may recommend wearing *antiembolic* hose. These are supportive stockings that decrease swelling, improve circulation, prevent blood clots from forming in your legs, and help your incisions stay closed. Wear them for 3 weeks after your surgery. They should be worn when you are out of bed and removed at night. After 3 weeks, continue wearing the hose only if you still notice swelling in your legs.

Home Activities After Your Surgery

After you return home, you will still need to avoid over-exerting your heart. Closely follow the guidelines in this section to help your recovery.

Your Daily Routine

The amount and type of activity you can do after discharge depends on your condition before surgery, the type of surgery done, and your recovery.

Sternal Precautions

During surgery, your breastbone (sternum) is divided down the middle and then wired back together with permanent stainless steel/titanium wires or cables. It will take about 3 months for this bone to heal. This is why you must avoid certain activities during your recovery.

For the first 6 to 8 weeks after surgery, you must follow these sternal precautions:

- Do not lift, push, or pull anything that weighs more than 10 pounds.
- Do not raise your elbows higher than your shoulders. The only exception is if both arms are raised together in front of your body.
- Do not reach behind your back or bend and reach sideways.

Activities

Do These Activities as Soon as You Wish – But Follow Sternal Precautions:

- Shower, shave, and wash your hair.
- Walk on level ground at a leisurely pace. Remember to slow down on hills.
- Walk up and down stairs at a normal pace – going up takes more energy. Slow down or stop when you become short of breath.
- Use a stationary bicycle with **no pressure on your arms**. (Use 2 fingers for support and balance.*)
- Ride in a car, go out for meals, or visit friends.
- Prepare meals.
- Wash dishes and clothes. Avoid lifting more than 10 pounds – such as a full laundry basket or an average grocery bag.
- Do light housekeeping.
- Resume sexual activity. (Don't support yourself on your arms.*)

** These restrictions apply for only 6 weeks after surgery.*

Avoid These Activities for 6 Weeks After Surgery:

- Lifting, pushing, pulling anything heavier than 10 pounds, including groceries, children, pets, garbage, etc.
- Isometric activities involving arms and chest muscles, such as opening a stuck window, unscrewing a tight lid, or doing heavy work with a screwdriver.
- Gardening, including lawn mowing and raking.
- Running, jogging, swimming, or vigorous biking.
- Sports such as golf, tennis, bowling, or softball.
- Driving a car or truck – this is to protect your sternum. During early recovery, your reaction time is slower and you will tire easily.

Exercise Guidelines

Daily exercise is a key part of your healing process. Regular exercise may help strengthen the heart muscle, allowing it to pump more efficiently. Exercise improves muscle tone and circulation, assists in weight loss or maintenance, and promotes a general sense of well-being.

- Use your pulse as your guide to tell you how hard your heart is working. Keep your pulse no greater than 20 to 30 beats per minute above your resting heart rate.
- Take the time to stretch your muscles before and after exercising for maximum efficiency and to prevent injuries.
- Wait 1 hour after eating before you exercise or walk. When you are walking long distances, stay on level ground. Hills and stairs are OK if you slow your pace to keep your heart rate within the guidelines.
- Wear comfortable, flat shoes and loose clothing. Any garment that restricts your movements may interfere with your breathing.
- Avoid being out on very hot or cold days during your recovery. Extreme temperatures add to heart stress. In the winter, walk in the afternoon or during the warmest part of the day. During the summer, walk in the morning or during the coolest part of the day.

How to Take Your Pulse

Your best guide to how hard your heart is working is your pulse. When you feel your pulse, you are actually feeling your heart pushing blood through your arteries.

Use your fingers (never your thumb, which has a pulse of its own) to find your pulse on the inner part of your wrist just below your thumb. If you can't find the wrist pulse, gently find the pulse in your neck. Do not press hard or you could reduce blood flow to your head, making you dizzy or faint. Start with 0, and count your pulse for 1 minute (or count for 15 seconds and multiply by 4). Check your pulse:

- ☐ When you are at rest.
- ☐ During activity.
- ☐ At the end of activity.

Use your pulse rate as your guide to how hard your heart is working. It's important that your heart rate does not increase to more than 20 to 30 beats per minute above your resting heart rate.

Warm-up Exercises

Daily exercise is important. Do the following exercises slowly and rhythmically without holding your breath. Be sure to consult your doctor before starting any exercise program.

These exercises should be done twice each day – once in the morning and once in the afternoon. Begin by doing 5 repetitions of each exercise. Increase up to a maximum of 20 repetitions. Do not increase your repetitions if you have any of the symptoms listed in the slow-down signals section (see below).

- ☐ Marching in place
- ☐ Leg stretches

Walking Progression

The distance and timing of your in-hospital walking program will be based on your tolerance. In the beginning, it's best to increase the distance you walk before increasing your walking pace. Remember to use your pulse rate as your guide to how hard your heart is working. The goal while you are in the hospital is to walk 3 to 4 times per day.

Slow-Down Signals

Your body will tell you if the exercise you are doing is too hard for you. If you experience any of the symptoms listed below, slow down, write down what happened, and talk with your nurse or doctor.

Reduce Your Exercise Level If:

- Your heart rate or pulse increases more than 20 to 30 beats above your resting heart rate.
- Your heart rate or pulse stays high for 10 minutes after exercise ends.
- You are breathless for longer than 10 minutes after exercise ends.
- You have prolonged fatigue, up to 24 hours later.
- You have pain in your joints, shins, or heels.
- You have pain or cramping in your calf muscles.

Stop Your Exercise and Talk with Your Doctor Before Starting Again If You:

- Have an abnormal heart rhythm – irregular pulse, palpitations, sudden very slow pulse, or sudden burst of rapid heartbeats.
- Have new or prolonged pain or pressure in your chest, arms, or throat.
- Are dizzy, confused, or light-headed.
- Lose coordination or faint.
- Have cold sweats or become pale.
- Have nausea or are vomiting.

Do Not Exercise If You Have:

- A bad cold, flu, or fever.
- Extreme fatigue.

Resuming Sexual Activity

It is normal to have some concerns about your return to sexual activity after open-heart surgery. These are best handled by talking openly with your partner. Sexual intimacy provides important physical and psychological satisfaction.

Ask your doctor or nurse any questions you may have. You do not need to be embarrassed. This is a common area of concern.

There is no reason to avoid sexual activity. Increased heart rate and rapid breathing are normal during arousal. During orgasm, the heart rate may increase about the same as briskly climbing 2 flights of stairs.

Sexual intimacy can take many forms. Touching, holding, and caressing without intercourse are ways to share intimacy during the early weeks of recovery if you are afraid or still feel very tired. As your daily activities, exercise, and endurance increase, you can judge for yourself when it is best to return to full sexual activity.

Some guidelines:

- You may resume sexual activity when you are comfortable and ready to do so.
- For 6 weeks, you should avoid positions that result in pressure on your chest, or put full weight on your elbows or arms.
- Sexual activity will be less stressful when both partners are relaxed. If you are upset, fatigued, or stressed, sexual activity should probably be avoided. Talking with your partner about any fears or concerns may help you relax and get in touch again.
- Wait 1 hour after meals or alcohol before beginning sexual activity. This will allow your digestion and other bodily processes time to work without competing for blood and oxygen.

Returning to Work

Talk about your return to work with your surgeon or cardiologist at your follow-up visit. Most patients are able to return to full employment within 3 months after surgery, and many return earlier.

Common Responses to Surgery***Sleep Disturbances***

During recovery after surgery, it is common to have:

- Increased sleep.
- Difficulty falling asleep.
- Waking during the night.
- Nightmares or very intense dreams.

These changes are probably due to many factors, such as interrupted sleep during your hospital stay, anesthesia, and medicines. As you catch up on your sleep at home and get back to your normal sleep cycle, these disturbances will resolve themselves.

Even if sleep disturbances make you feel tired and weak, make the effort to get dressed every day and do your normal activities. Go for a walk, have lunch, then take a nap. Remember to rest between your activities.

You will sleep better at night if you are physically active during the day. Don't sleep all day and then lie awake at night.

Temporary Depression and Mood Swings

People recovering from heart surgery sometimes become depressed. You may find yourself crying for no apparent reason, or feeling more emotional or sentimental than normal. We don't know exactly why this happens. Some patients have found that increasing activity and pursuing old interests help to relieve this depression.

If mood changes occur, you and your family will be better able to cope knowing it is common and temporary. If you want to consider medicine to help with depression after cardiac surgery, talk to the nurse practitioner on call at 206-598-6190.

Restlessness and Inability to Concentrate

After surgery, it is common to be irritable and restless, and to find it hard to concentrate. You may find that things you thought you would look forward to doing during recovery hold little or no interest. These reactions are common and temporary after any major surgery. With time, your interests should return to normal.

Temporary Memory Loss

It is very common for people to have a period after surgery when their attention span is short and their short-term memory is poor. This may be due to many factors, including anesthesia and medicines. With time, your memory should return to normal.

Decreased Appetite

A decreased appetite is also common after heart surgery. At the same time, your body needs increased calories for healing. We recommend you eat what appeals to you in the first weeks after surgery. After 6 to 8 weeks, dietary changes such as decreased fat, cholesterol, and salt may be needed. If you have had a coronary artery bypass or have a history of coronary artery disease, we suggest you follow a heart-healthy diet.

Independence

Before surgery, you may have become more dependent on family members or friends as your health declined. With successful heart surgery, you will once again be able to be more independent and no longer need the help you once did. Those close to you will have to adjust to this change in your lifestyle.

Your Health Care Team

Many people are involved in your care during your hospital stay. A team of specialists provides expert care before, during, and after your surgery. This team includes:

- **Cardiac surgeons**, who perform the heart surgery. Your cardiac surgeon will talk with you before surgery and direct your care during recovery. UWMC's team of cardiac surgeons works closely together. One of these surgeons is available at all times.
- **Cardiac anesthesiologists**, who administer your anesthesia and check and treat your physical condition at all times during surgery and right afterward.
- **Cardiac services nurses**, who are specially trained in the care of heart surgery patients. They will teach you about your heart surgery, and will care for you during your recovery from surgery.
- **Cardiac surgery nurse practitioners**, who communicate directly with the surgeons and oversee your care while you are on 5-Northeast, as well as answer questions after your discharge. You will be followed by them in clinic appointments.
- **Cardiac surgery pharmacists**, who monitor your medicine therapy throughout your hospital stay and will teach you about your medicines before your return home.
- **Dietitians**, who assist you and your family in planning any needed changes in your diet.
- **Perfusionists**, who run the heart-lung machine during surgery.
- **Physical therapists**, who teach you exercises and, if needed, help you recover physical strength after your surgery.
- **Physician assistants**, who work with you, your surgeon, and your nurse to provide your care in the hospital and at follow-up visits.
- **Respiratory therapists**, who help in your care while you are in the critical care center. They manage the mechanical ventilator and assist with breathing exercises.
- **Social workers**, who can help you with discharge planning, care after leaving the hospital, housing, support, and counseling.
- **Surgical residents**, who are doctors completing post-graduate training in surgery. The team of residents is led by the *chief cardiac fellow*, who has completed 5 years of post-graduate training in surgery and is continuing specialty training in cardiovascular surgery. Surgical residents play an integral role in your care during your hospital stay.

Glossary of Medical Terms

ACE inhibitors – A group of medicines used to treat heart failure and high blood pressure by decreasing the workload of the heart.

Aerobic exercise – Exercise in which the body continuously meets the muscles' increased demand for oxygen. During aerobic exercise such as swimming, jogging, and cycling, the rate at which oxygen reaches the muscles keeps pace with the rate at which it is used up.

Angina pectoris – Chest pain or pressure caused by narrowing or blocking of the coronary arteries. The pain may radiate to the left arm or jaw.

Angioplasty – A procedure to widen a narrowing in the coronary arteries. During the procedure, a balloon-tipped catheter is inserted into the artery. The balloon is then filled with air, pressing the buildup of fatty plaque deposits against the artery walls. Also see *percutaneous transluminal coronary angioplasty (PTCA)*.

Antiarrhythmic agents – Medicines used to treat abnormal heart rhythms. They work directly on heart tissue by slowing the impulses along special nerve networks in the heart. This allows the heart to work more efficiently.

Anticoagulant – Any substance (drug) given to prevent clotting of the blood (for example, heparin or Coumadin).

Aorta – The main branch of the arterial system that carries oxygen-rich blood from the left ventricle of the heart to the rest of the body.

Arrhythmia – An abnormal heart rhythm or change from the usual rhythm pattern of the heart.

Artery – A blood vessel that carries oxygen-rich blood away from the heart. The thick walls of an artery enable it to handle the blood pressure created every time the heart muscle beats.

Atherosclerosis – A disease in which fatty deposits (plaque) form on the inner walls of the arteries, especially the coronary arteries, causing narrowing or blockage that can lead to heart attack (*myocardial infarction*).

Atria – The upper chambers of the heart. The right atrium receives blood that has been through the body and contains waste (carbon dioxide). The left atrium receives “fresh” oxygenated blood from the lungs, and sends it to the left ventricle for pumping out to the rest of the body's tissues.

Atrial fibrillation – A type of irregular heartbeat in which the atria quiver erratically, causing the heart to beat irregularly and rapidly.

Beta blockers – A group of medicines that reduce the workload of the heart by slowing down the heart rate and lowering the blood pressure. Beta blockers can reduce the symptoms of *angina*.

Blood pressure – As blood is pumped through the arteries, it pushes against the arterial walls. This force against the artery wall is called blood pressure.

Bradycardia – A slow heartbeat (usually fewer than 50 or 60 beats per minute).

Calcium channel blockers – A group of medicines used to prevent chest pain (angina), treat abnormal heart rhythms, lower blood pressure, and prevent spasm of the heart vessels that have been opened with balloon angioplasty or after heart bypass surgery.

Cardiac – Having to do with, or referring to, the heart.

Cardiac arrest – See *Ventricular fibrillation*.

Cardiac catheterization – A procedure in which a tiny catheter is passed through an artery (usually in the leg) into the chambers of the heart to study the heart structure. The catheter may also be inserted into the blood vessels on the outside of your heart. Dye is injected to show the shape of the vessels.

Cardiac Intensive Care Unit (CICU) – The intensive care unit where you will be monitored and cared for by highly skilled health care team members. The CICU has state-of-the-art equipment so that the condition of seriously ill patients can be monitored at all times and, if needed, treated right away.

Cardiac surgeon – A doctor specializing in operations on the heart and the blood vessels to prevent or repair damage caused by conditions such as birth defects, clogged arteries, or heart attacks.

Cardiologist – A doctor specializing in the diagnosis and treatment of heart disease.

Cardiomyopathy – A term used to describe diseases of the heart muscle that affect the pumping ability of the heart.

Catheter – A tubular, flexible instrument used to gain access to a cavity of the body or blood vessels.

Catheter ablation – A procedure to treat rapid heart beats. An ablation uses radio frequency to interrupt the pathway between the *atrium* (right or left upper chamber of the heart) and the *ventricle* (right or left lower chamber of the heart).

Cholesterol – A fatty substance found in foods and also made by the body. Cholesterol helps the body produce steroid hormones and bile acids. It is needed for strengthening cell membranes. Most cholesterol in the blood is made by the liver from a wide variety of foods, but especially from saturated fats. Food sources of cholesterol such as eggs, meats, dairy, and plants play a much smaller role in raising blood cholesterol levels that do saturated fats.

Congenital – A term that means “present at birth.” A congenital abnormality is a defect that has been present since birth. It may have been inherited from parents, occurred due to damage or infection in the uterus, or occurred at the time of birth.

Coronary artery – A blood vessel that encircles and supplies the heart muscle with blood and oxygen.

Coronary artery bypass graft (CABG) – A heart surgery performed to bypass narrowed or blocked coronary arteries by *grafting* (attaching) additional blood vessels to provide blood flow to the heart muscle.

Coronary artery disease (CAD) – Another name for *atherosclerosis* of the arteries.

Coronary stent – A small, slotted stainless steel tube mounted on a balloon catheter and used to open constricted arteries. It is left in place in the coronary arteries. In many cases, this technique is used to avoid the need for bypass surgery.

Defibrillation – During cardiac arrest, delivery of an electric shock to restore a heartbeat to normal.

Diastolic pressure – Blood pressure is composed of two numbers – for example, 120/80 (read “120 over 80”). The second or bottom number is the diastolic pressure. This is the pressure in the arteries at rest, before the heart beats again.

Edema – An abnormal accumulation of fluid in cells, tissues, or cavities of the body, most times resulting in swelling.

Electrocardiogram (ECG) – A recording of the electrical pattern of the heart muscle function.

Electrode – A patch placed on your skin that conducts electrical signals from your heart.

Electrolyte – A substance whose molecules split into their electrically charged particles (*ions*) when dissolved or melted. Electrolytes and ions that help regulate body processes include sodium, potassium, hydrogen, magnesium, calcium, bicarbonate, phosphate, and chloride.

Electrophysiology – The field of scientific study of physiology and its relation to electricity, such as the measuring, evaluation, and treatment of the electrical signals inside the heart.

Heart attack – See *Myocardial infarction*.

Heart failure – A condition caused by ineffective pumping of the heart. This results in a buildup of extra fluid in the body.

Hematocrit – A measurement of red blood cells.

Hematoma – A collection of blood under the skin (bruise and/or bump) caused by bleeding from a ruptured blood vessel.

High-density lipoprotein (HDL) – Known as “good” cholesterol, HDL is believed to remove fat and cholesterol from the bloodstream and artery walls and return them to the liver for disposal. Higher blood levels of HDL are found in people who exercise, maintain a healthy weight, and who don’t smoke.

Hypertension – A medical term for high blood pressure.

Implantable defibrillator system (IDS) – A device to treat life-threatening heart rhythms. It is used to treat patients with uncontrolled *ventricular tachycardia* or *ventricular fibrillation*. Also known as *automatic implantable cardiovascular defibrillator* (AICD).

Incentive spirometer – A plastic instrument that measures how deeply a person is breathing.

Internal mammary artery (IMA) – The IMA, about the size of the coronary artery, lies under the chest wall. It can be detached and sewn into the coronary artery as part of *coronary artery bypass graft surgery*.

Intravenous (IV) – The introduction of a fluid into the bloodstream from a plastic or glass container. An IV catheter is a thin plastic tube inserted into a vein, through which fluids and medicines can be given.

Ischemia – Temporary deficiency of blood supply to an organ due to narrowing or obstruction of a blood vessel.

Low-density lipoprotein (LDL) – Known as “bad” cholesterol, LDL may increase fat buildup and cholesterol inside blood vessel walls.

Myocardial infarction – A blockage of blood supply from the coronary arteries to the heart muscle, causing permanent injury. A myocardial infarction (MI) is also referred to as a “heart attack.”

Nitroglycerin – A medicine that relieves and prevents chest pain (*angina*) and improves the supply of blood and oxygen by dilating the arteries that surround the heart.

Normal sinus rhythm – The normal cardiac rhythm in which special pathways carry the heart’s electrical signal through the *sinoatrial* (SA) node to the *atrioventricular* (AV) node to all parts of both ventricles, causing them to contract.

Occupational therapist – A health care professional who teaches you how to safely resume activities of daily living such as toileting, showering, and dressing.

Open heart surgery – Any surgery that requires a heart-lung machine is referred to as “open heart surgery,” whether or not the surgeon opens the heart.

Palpitations – Awareness of the heartbeat, sometimes felt as a “skipped beat” or a fluttering sensation.

Pericardium – The thin sac surrounding the heart.

Percutaneous transluminal coronary angioplasty (PTCA) – Also known as *balloon angioplasty*, this procedure uses a balloon catheter to expand narrow arteries. This technique is often used to avoid the need for surgery, although narrowing of the vessel may recur.

Permanent pacemaker – An electronic device implanted just beneath the collarbone, used to stimulate the heart to beat.

Plaque – Fatty deposits that form on the inner walls of the arteries, especially the coronary arteries, causing narrowing or blockage, which can lead to a heart attack.

Premature ventricular contractions (PVCs) – The most common type of *arrhythmia*. PVCs occur when an area in the heart’s ventricles fires early or out of turn. These premature beats are often referred to as “skipped” or “extra” beats.

Pulmonary edema – When the heart’s left side doesn’t pump properly, blood backs up in the lung’s blood vessels. This causes increased pressure, during which fluid can be forced out of the blood vessels into the lungs. This usually results in shortness of breath.

Sheath – A short tube used to protect the blood vessel during a *catheterization* procedure.

Sodium – A mineral that helps maintain the proper amount of fluid in the bloodstream, as well as in and around body cells. Too much sodium causes the body to hold water and increases its blood volume, which may lead to high blood pressure.

Stenosis – Narrowing or constriction of an opening, valve, or passageway in the body.

Sternum – The breastbone.

Stroke – Damage to part of the brain, caused when its blood supply is interrupted or blood leaks outside of vessel walls. Sensation, movement, or function controlled by the damaged area may be affected.

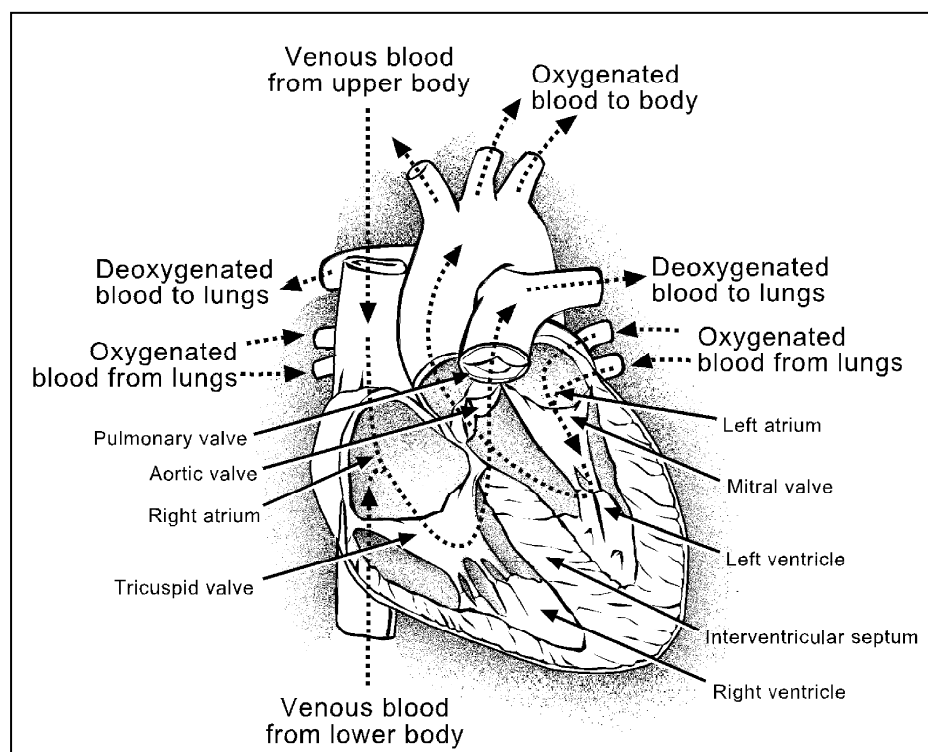
Systolic pressure – Blood pressure is composed of two numbers – for example, 120/80 (read “120 over 80”). The first or top number is the systolic pressure. It represents the pressure in your arteries after the heart has pumped a new surge of blood.

Tachycardia – Rapid heart beat.

Telemetry monitoring – By using radio signals, your heart’s electrical activity can be continuously sent to a heart monitor for nurses and/or other members of the cardiac care team to view. To do this, electrode patches are placed on your chest. These electrodes are connected to a small, battery-powered *telemetry box*.

Thrombin – An element of the blood used in clotting.

Urinary catheter – Also known as a Foley catheter; a tube inserted into the bladder to help you pass urine.



The valves and ventricles of the heart.

Valves – Structures that allow fluid or semifluid material to flow in one direction through a tube or passageway, but then close to prevent flow in the opposite direction. The body’s most important valves are at the exits from the heart chambers and in the veins.

Veins – The vessels or pathways that bring blood back from various organs and tissues of the body to the heart.

Venectomy – Removal of a vein or part of a vein.

Ventilator – A machine that helps patients breathe during and right after surgery, or for patients who are unable to breathe due to injury or illness.











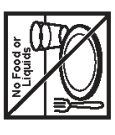
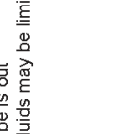
















Ventricles – The lower chambers of the heart, consisting of the right and left ventricles. The right ventricle pumps blood through the pulmonary artery to the lungs to remove carbon dioxide waste. The left ventricle, which has received the “fresh,” oxygen-rich blood, pumps the blood out to the rest of the body’s tissues.

Ventricular fibrillation (VF) – Also known as cardiac arrest, VF is an electrical pattern that causes the heart to fibrillate or quiver. As a result, one’s heart may suddenly stop pumping blood, causing loss of consciousness.

Ventricular tachycardia – A rapid, often dangerous heart rhythm that starts in the ventricles.

Open Heart Surgery Patient CareMap®

Your care plan may be different.

Unit	Day Before Surgery	Day of Surgery	Day 1 After Surgery	Day 2	Day 3	Day 4	Day 5	Home Care
		Cardiac Intensive Care Unit and Surgical Floor	Surgical Floor				 Discharge Home	
Activity	• Bed rest • Chair 	• Chair for meals • Walk in room 2-3 times with help  Walk in Room	• Chair for meals • Walk 100-240' 4 times 	• Chair for meals • Walk 240-480' 4 times 	• Chair for meals • Walk 480' 4 times 	• Chair for meals • Walk 480' 4 times 	• Chair for meals • Walk 480' 4 times 	• Follow activity guidelines from physical therapist 
Treatments	• Oxygen by mask or nasal prongs after breathing tube is out Weight _____ Goal Weight _____	• Do breathing exercises 10 times each hour • Chest tubes and urinary catheter out • Heart rhythm monitor Weight _____ Kgs above preop _____	• Do breathing exercises 10 times each hour • Chest tubes and urinary catheter out • Heart rhythm monitor Weight _____ Kgs above preop _____	• Oxygen discontinued if no longer needed Weight _____ Kgs above preop _____	• Pacer wires out Weight _____ Kgs above preop _____	• Do breathing exercises 10 times each hour while awake for 1 more week • Weigh daily	• Do breathing exercises 10 times each hour while awake for 1 more week • Weigh daily	• Do breathing exercises 10 times each hour while awake for 1 more week • Weigh daily
Diet	• No food or liquids after midnight 	• Sips of water and ice chips when breathing tube is out • Fluids may be limited 	• Sips of water and ice chips when breathing tube is out • Fluids may be limited 	• Goal: Eat 50% of meals, no nausea 	• Goal: Eat 75% of meals, no nausea 	• Regular Meals 	• Regular Meals 	• Regular Meals 
Hygiene	• Pre-operative shower 	• Sponge bath 	• Wash sitting up in chair 	• Shower 24 hours after chest tubes out 	• Shower 	• Shower 	• Shower 	• Watch incision for signs of infection 
Education	• Watch video: "Open Heart Surgery" • Read through "Your Guide to Cardiac Surgery"	• Surgeon talks with family in waiting room 			• Patient Education Videos (see video list) • Refer to class schedule on wall	• Video/Educational TV 	• Education Videos • "Open Heart Surgery Home Recovery" • "Fitness" • "Diet" • "Lifestyle Changes"	

Questions?

Your questions are important. Call your Cardiac Surgery Team if you have questions or concerns.

Cardiac Surgery ARNP
on call: 206-598-6190

Cardiac Surgery Clinic:
206-598-8017

Cardiac Surgery Patient
Care Coordinator:
206-598-3636

Notes

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